#6

SEQUENCE LISTING

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taaaatttaa cacaaggagt aatag gtg aaa ctc aca ccc aaa gag caa gaa 232
Val Lys Leu Thr Pro Lys Glu Gln Glu
1 5

aag ttc ttg tta tat tat gcg ggc gaa gtg gct aga aag cgc aaa gca 280
Lys Phe Leu Leu Tyr Tyr Ala Gly Glu Val Ala Arg Lys Arg Lys Ala
10 15 20 25

gag ggc tta aag ctc aac caa ccc gaa gcc att gct tac att agt gcc 328
Glu Gly Leu Lys Leu Asn Gln Pro Glu Ala Ile Ala Tyr Ile Ser Ala
30 35 40

cat att atg gac gaa gcg cgc cgt gga aaa aaa acc gtt gcc cag ctt 376
His Ile Met Asp Glu Ala Arg Arg Gly Lys Lys Thr Val Ala Gln Leu
45 50 55

atg gaa gag tgc atg cac ttt ttg aaa aaa gat gaa gta atg ccc ggg 424
Met Glu Glu Cys Met His Phe Leu Lys Lys Asp Glu Val Met Pro Gly
60 65 70

gtg ggt aat atg gtt ccc gat cta ggt gta gaa gcc acc ttt cct gat 472
Val Gly Asn Met Val Pro Asp Leu Gly Val Glu Ala Thr Phe Pro Asp
75 80 85

ggt acg aaa ctt gta act gtg aat tgg ccc atc gaa cca gat gag cac 520
Gly Thr Lys Leu Val Thr Val Asn Trp Pro Ile Glu Pro Asp Glu His
90 95 100 105

ttc aaa gcg ggc gaa gtg aaa ttt ggt tgc gat aaa gac atc gag ctc 568
Phe Lys Ala Gly Glu Val Lys Phe Gly Cys Asp Lys Asp Ile Glu Leu
110 115 120

aat gca ggc aaa gaa gta acc gaa ctt gag gtt act aat gaa ggg cct 616
Asn Ala Gly Lys Glu Val Thr Glu Leu Glu Val Thr Asn Glu Gly Pro
125 130 135

aaa tcc ttg cat gtg ggt agc cat ttc cac ttc ttt gaa gct aac aag 664
Lys Ser Leu His Val Gly Ser His Phe His Phe Phe Glu Ala Asn Lys
140 145 150

gca cta aaa ttc gat cgt gaa aaa gcc tat ggc aaa cgc cta gat att 712

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Ala Leu Lys Phe Asp Arg Glu Lys Ala Tyr Gly Lys Arg Leu Asp Ile
    155                 160                 165

ccc tct ggc aac acg cta cgc att ggg gca gga caa acc cgc aaa gtg   760
Pro Ser Gly Asn Thr Leu Arg Ile Gly Ala Gly Gln Thr Arg Lys Val
170                 175                 180                 185

cag ttg att cct ctt ggt ggc agt aaa aaa gtg att ggc atg aac ggg   808
Gln Leu Ile Pro Leu Gly Gly Ser Lys Lys Val Ile Gly Met Asn Gly
                190                 195                 200

ctt gtg aat aac atc gcg gat gaa cgc cat aaa cat aaa gcg ctt gac   856
Leu Val Asn Asn Ile Ala Asp Glu Arg His Lys His Lys Ala Leu Asp
            205                 210                 215

aag gcg aaa tct cac gga ttt atc aag taa ggagactccc atg aaa atg    905
Lys Ala Lys Ser His Gly Phe Ile Lys                 Met Lys Met
        220                 225                             230

aaa aaa caa gaa tat gta aat acc tac gga ccc acc aaa ggc gat aaa   953
Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Lys Gly Asp Lys
                235                 240                 245

gtg cgc tta gga gat acc gat ctt tgg gca gaa gta gaa cat gac tat   1001
Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu His Asp Tyr
            250                 255                 260

acc acc tat ggc gaa gaa ctt aaa ttt ggc gcg ggt aaa act atc cgt   1049
Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys Thr Ile Arg
        265                 270                 275

gag ggt atg ggt cag agc aat agc cct gat gaa aac acc cta gat tta   1097
Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr Leu Asp Leu
    280                 285                 290

gtc atc act aac gcg atg att atc gac tac acc ggg att tac aaa gcc   1145
Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile Tyr Lys Ala
295                 300                 305                 310
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gac att ggg att aaa aac ggc aaa atc cat ggc att ggc aag gca gga   1193
Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly Lys Ala Gly
                315                 320                 325

aac aag gac atg caa gat ggc gta agc cct cat atg gtc gtg ggt gtg   1241
Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val Val Gly Val
            330                 335                 340

ggc aca gaa gca cta gca ggg gaa ggt atg att att acc gct ggg gga   1289
Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr Ala Gly Gly
        345                 350                 355

atc gat tca cac acc cac ttc ctt tct cca caa caa ttc cct acc gct   1337
Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe Pro Thr Ala
    360                 365                 370

cta gcc aat ggc gtt aca acc atg ttt gga ggc ggc aca ggt cct gta   1385
Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr Gly Pro Val
375                 380                 385                 390

gat ggc acg aat gcg act act atc act ccg ggc aaa tgg aac ttg cac   1433
Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp Asn Leu His
                395                 400                 405

cgc atg ttg cgc gca gca gaa gag tat tct atg aat gtg ggc ttt ttg   1481
Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val Gly Phe Leu
            410                 415                 420

ggc aaa ggc aat agc tct agc aaa aaa caa ctt gta gaa caa gta gaa   1529
Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu Gln Val Glu
        425                 430                 435

gcg ggc gcg att ggt ttt aaa ttg cat gaa gac tgg ggc aca aca cca   1577
Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly Thr Thr Pro
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agt gcg atc gat cac tgc ttg agc gtg gca gat gaa tac gat gtg caa   1625
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Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr Asp Val Gln
455                 460                 465                 470

gtt tgt atc cac acc gat aca gtc aat gag gca ggt tat gta gat gac   1673
Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr Val Asp Asp
                475                 480                 485

acc cta aat gca atg aac ggg cgc gcc atc cat gcc tac cac att gag   1721
Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr His Ile Glu
            490                 495                 500

gga gcg ggt gga gga cac tca cct gat gtt atc acc atg gca ggc gag   1769
Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met Ala Gly Glu
        505                 510                 515

ctc aat att cta ccc tcc tcc acc acc ccc act att ccc tat acc att   1817
Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro Tyr Thr Ile
    520                 525                 530

aat acg gtt gca gaa cac tta gac atg ctc atg aca tgc cac cac cta   1865
Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys His His Leu
535                 540                 545                 550

gac aaa cgc atc cgc gag gat tta caa ttt tct caa agc cgt atc cgc   1913
Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser Arg Ile Arg
                555                 560                 565

ccc ggc tct atc gcg gct gaa gat gtg ctc cat gat atg ggt gtg atc   1961
Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Met Gly Val Ile
            570                 575                 580

gcg atg aca agc tcg gat tcg caa gca atg ggg cgt gca ggc gaa gtg   2009
Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala Gly Glu Val
        585                 590                 595

att cct cga act tgg cag act gcg gat aag aat aaa aaa gaa ttt ggt   2057
Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys Glu Phe Gly
    600                 605                 610
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aag ctt cct gaa gat ggc aaa gat aac gat aat ttc cgc att aag cgc   2105
Lys Leu Pro Glu Asp Gly Lys Asp Asn Asp Asn Phe Arg Ile Lys Arg
615                 620                 625                 630

tac atc tcc aaa tac act atc aac ccc gct ttg acc cac ggc gtg agc   2153
Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His Gly Val Ser
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gag tat atc ggc tct gtg gaa gag ggc aag atc gcc gac ttg gtg gtg   2201
Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp Leu Val Val
            650                 655                 660

tgg aat cct gcc ttt ttt ggc gta aaa ccc aaa atc gtg atc aaa ggc   2249
Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val Ile Lys Gly
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ggt atg gtg gtc ttc tct gaa atg ggc gat tct aac gcg tct gtg ccc   2297
Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala Ser Val Pro
    680                 685                 690

act ccc caa ccg gtt tat tac cgc gaa atg ttt ggg cat cac ggc aag   2345
Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His His Gly Lys
695                 700                 705                 710

gcg aaa ttt gac acc agc atc act ttt gtt tcc aaa gtc gcc tat gaa   2393
Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val Ala Tyr Glu
                715                 720                 725

aat ggc gtg aaa gaa aag ctg ggc tta gag cgc caa gtt cta ccg gtc   2441
Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Gln Val Leu Pro Val
            730                 735                 740

aaa aac tgc cgt aac atc acc aag aaa gac ttc aag ttc aac gac aaa   2489
Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe Asn Asp Lys
        745                 750                 755

acg gca aaa atc acc gtc gat ccg aaa acc ttc gag gtc ttt gta gat   2537
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Thr Ala Lys Ile Thr Val Asp Pro Lys Thr Phe Glu Val Phe Val Asp
760 765 770

ggc aaa ctc tgc acc tct aaa ccc acc tcg caa gtg cct cta gcc cag 2585
Gly Lys Leu Cys Thr Ser Lys Pro Thr Ser Gln Val Pro Leu Ala Gln
775 780 785 790

cgc tac act ttc ttc tag gcacaatgcc ccctttgggg gcaggttatt 2633
Arg Tyr Thr Phe Phe
795

ttaggaatct tcatcaaacg cacctgcaat cggtcttgcg tgtgcgatcg tgtcgcttta 2693

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35 40 45

Arg Gly Lys Lys Thr Val Ala Gln Leu Met Glu Glu Cys Met His Phe

50 55 60

Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
65 70 75 80

Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
85 90 95

Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
100 105 110

Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
115 120 125

Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
130 135 140

His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
145 150 155 160

Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
165 170 175

Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
180 185 190

Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
195 200 205

Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
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Ile Lys
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His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
        35                  40                  45

Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
    50                  55                  60

Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
65                  70                  75                  80

Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
                85                  90                  95

Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
            100                 105                 110

Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
        115                 120                 125

Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
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Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
145                 150                 155                 160

Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
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Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
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180 185 190

Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
195 200 205

Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
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Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225 230 235 240

Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
245 250 255

Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
260 265 270

His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met
275 280 285

Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
290 295 300

Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
305 310 315 320

His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
325 330 335

Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Met
340 345 350

Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
355 360 365

Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
370 375 380

Glu Phe Gly Lys Leu Pro Glu Asp Gly Lys Asp Asn Asp Asn Phe Arg
385 390 395 400

Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
405 410 415

Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
420 425 430

Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
435 440 445

Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
450 455 460

Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
465 470 475 480

His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
485 490 495

Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Gln Val
500 505 510

Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe
515 520 525

Asn Asp Lys Thr Ala Lys Ile Thr Val Asp Pro Lys Thr Phe Glu Val
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ggc gaa gtg gct aga aag cgc aaa gca gag ggc tta aag ctc aat caa   96
Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
             20                  25                  30

ccc gaa gcc att gcc tac att agt gcc cat att atg gac gag gcg cgc   144
Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
         35                  40                  45

cgt ggc aaa aaa acc gtt gct gaa ctt atg gaa gaa tgt atg cac ttt   192
Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
     50                  55                  60

ttg aaa aaa gat gag gtg atg ccc ggt gtg ggg aat atg gtc cct gat   240
Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
 65                  70                  75                  80

ttg ggc gta gaa gcc act ttc ccc gat ggc acc aaa ctc gta acc gtg   288
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                 85                  90                  95
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Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
100 105 110

ttt ggc tgt gat aaa gac att gag ctc aac gcg ggt aag gaa gtt acc 384
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
115 120 125

gag ctt gaa gtt acc aac gaa gga cct aaa tcc ttg cat gtg ggt agc 432
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
130 135 140

cat ttc cac ttc ttt gaa acc aac aag gca ttg aaa ttc gat cgg gaa 480
His Phe His Phe Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg Glu
145 150 155 160

aaa gcc tat ggc aaa cgc cta gat att ccc tct ggc aac acg cta cgc 528
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
165 170 175

att ggg gca gga caa acc cgt aaa gtg cag tta atc cct ctt ggc ggt 576
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
180 185 190

agt aaa aaa gtg att ggc atg aac ggg ctt gtg aat aat att gcg gac 624
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
195 200 205

gaa cgc cat aaa cac aaa gca cta gac aag gca aaa tct cac gga ttc 672
Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
210 215 220

atc aag taa ggagactccc atg aaa atg aaa aaa caa gag tat gta aac 721
Ile Lys Met Lys Met Lys Lys Gln Glu Tyr Val Asn
225 230 235

acc tac gga ccc acc aca ggc gat aaa gtg cgc tta gga gat acc gat 769
Thr Tyr Gly Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr Asp

240 245 250

ctt tgg gca gaa gta gaa cat gac tat acc act tat ggc gaa gag ctc 817
Leu Trp Ala Glu Val Glu His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu
255 260 265

aaa ttt ggc gcg ggt aaa act atc cgt gag ggt atg ggt cag agc aat 865
Lys Phe Gly Ala Gly Lys Thr Ile Arg Glu Gly Met Gly Gln Ser Asn
270 275 280 285

agc cca gat gaa aac acc tta gat tta gtg atc acc aac gcg atg att 913
Ser Pro Asp Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met Ile
290 295 300

atc gac tac acc ggg att tat aaa gcc gac att ggt att aaa aat ggc 961
Ile Asp Tyr Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly
305 310 315

aaa atc cat ggt att ggc aag gcg ggg aac aaa gac atg caa gat ggc 1009
Lys Ile His Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp Gly
320 325 330

gta agc cct cat atg gtc gtg ggt gtg ggc aca gaa gca cta gca ggg 1057
Val Ser Pro His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala Gly
335 340 345

gaa ggt atg att att acc gct ggg ggg atc gat tcg cac acc cac ttc 1105
Glu Gly Met Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His Phe
350 355 360 365

ctc tct ccc caa caa ttc cct acc gct cta gcc aat ggt gtt aca acc 1153
Leu Ser Pro Gln Gln Phe Pro Thr Ala Leu Ala Asn Gly Val Thr Thr
370 375 380

atg ttt gga ggt ggc aca ggt ccg gta gat ggc acg aat gcg acc acc 1201
Met Phe Gly Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr Thr
385 390 395

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atc act ccg ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gct gaa   1249
Ile Thr Pro Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala Glu
        400                 405                 410

gag tat tct atg aat gtg ggc ttt ttg ggc aaa ggc aat agc tcc agt   1297
Glu Tyr Ser Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser
    415                 420                 425

aaa aaa caa ctc gta gaa caa gta gaa gcg ggc gcg att ggc ttt aaa   1345
Lys Lys Gln Leu Val Glu Gln Val Glu Ala Gly Ala Ile Gly Phe Lys
430                 435                 440                 445

ttg cat gaa gac tgg ggc aca aca cca agt gcg atc gat cac tgc ttg   1393
Leu His Glu Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys Leu
                450                 455                 460

agc gta gca gat gaa tac gat gtg caa gtt tgt atc cac acc gat acg   1441
Ser Val Ala Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp Thr
            465                 470                 475

gtc aat gag gca ggt tat gta gat gac acc cta aat gcg atg aac ggg   1489
Val Asn Glu Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn Gly
        480                 485                 490

cgc gcc atc cat gcc tac cac att gag gga gcg ggc gga gga cac tca   1537
Arg Ala Ile His Ala Tyr His Ile Glu Gly Ala Gly Gly Gly His Ser
    495                 500                 505

cct gat gtt atc acc atg gca ggc gag ctc aat att cta ccc tcc tcc   1585
Pro Asp Val Ile Thr Met Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser
510                 515                 520                 525

acc acc ccc act att ccc tat acc att aat acg gtt gca gaa cac tta   1633
Thr Thr Pro Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His Leu
                530                 535                 540

gac atg ctc atg acc tgc cac cac cta gac aaa cgc atc cgc gag gat   1681
Asp Met Leu Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu Asp
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            545                 550                 555

ctc cag ttt tcc caa agc cgt atc cgc ccc ggc tct att gcc gct gaa   1729
Leu Gln Phe Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu
        560                 565                 570

gat gtg ctc cat gat att ggc gtg atc gcg atg aca agc tcg gat tcg   1777
Asp Val Leu His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp Ser
    575                 580                 585

caa gca atg ggg cgc gct ggg gaa gtg att cct aga act tgg caa act   1825
Gln Ala Met Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln Thr
590                 595                 600                 605

gca gac aag aat aaa aaa gaa ttt ggt aag ctt cct gaa gat ggt gca   1873
Ala Asp Lys Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala
                610                 615                 620

gat aat gac aac ttc cgc atc aaa cgc tat atc tcc aaa tac acc att   1921
Asp Asn Asp Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile
            625                 630                 635

aat ccc gct ttg acc cat ggc gtg agc gag tat atc ggc tct gtg gaa   1969
Asn Pro Ala Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val Glu
        640                 645                 650

gag ggc aag atc gcc gac ttg gtg gtg tgg aat cct gct ttc ttt ggt   2017
Glu Gly Lys Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe Gly
    655                 660                 665

gta aaa ccc aaa atc gtg atc aaa ggc ggt atg gtg gtg ttc tct gaa   2065
Val Lys Pro Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser Glu
670                 675                 680                 685

atg ggc gat tct aac gcg tct gtg ccc aca cct cag ccg gtt tat tac   2113
Met Gly Asp Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr
                690                 695                 700
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cgc gaa atg ttt ggg cat cac ggc aag gcg aaa ttt gac acc agc atc   2161
Arg Glu Met Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser Ile
            705                 710                 715

act ttt gtt tcc aaa gtc gcc tat gaa aat ggc gtg aaa gaa aaa cta   2209
Thr Phe Val Ser Lys Val Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu
        720                 725                 730

ggc tta gag cgc aag gtg cta ccc gtg aaa aac tgc cgc aac atc act   2257
Gly Leu Glu Arg Lys Val Leu Pro Val Lys Asn Cys Arg Asn Ile Thr
    735                 740                 745

aag aaa gac ttc aaa ttc aac aac aag acg gcg cat atc act gtc gat   2305
Lys Lys Asp Phe Lys Phe Asn Asn Lys Thr Ala His Ile Thr Val Asp
750                 755                 760                 765

cct aaa acc ttc gag gtc ttt gta gat ggc aaa ctc tgc acc tct aaa   2353
Pro Lys Thr Phe Glu Val Phe Val Asp Gly Lys Leu Cys Thr Ser Lys
                770                 775                 780

ccc gcc tct gaa gtg cct cta gcc caa cgc tac act ttc ttc tag       2398
Pro Ala Ser Glu Val Pro Leu Ala Gln Arg Tyr Thr Phe Phe
            785                 790                 795

gcacaat                                                          2405
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<210> 5
<211> 226
<212> PRT
<213> Helicobacter felis

<400> 5

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Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
  1               5                  10                  15

Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
            20                  25                  30
```

Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
35 40 45

Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
50 55 60

Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
65 70 75 80

Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
85 90 95

Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
100 105 110

Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
115 120 125

Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
130 135 140

His Phe His Phe Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg Glu
145 150 155 160

Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
165 170 175

Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
180 185 190

Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
195 200 205

Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
210 215 220

Ile Lys

225

<210> 6
<211> 568
<212> PRT
<213> Helicobacter felis

<400> 6

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Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Thr
  1               5                  10                  15

Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu
             20                  25                  30

His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
         35                  40                  45

Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
     50                  55                  60

Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
 65                  70                  75                  80

Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
                 85                  90                  95

Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
            100                 105                 110

Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
        115                 120                 125

Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
    130                 135                 140

Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
145                 150                 155                 160
```

Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
165 170 175

Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
180 185 190

Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
195 200 205

Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
210 215 220

Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225 230 235 240

Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
245 250 255

Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
260 265 270

His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met
275 280 285

Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
290 295 300

Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
305 310 315 320

His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
325 330 335

Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
340 345 350

Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala

355 360 365

Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
370 375 380

Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp Asn Phe Arg
385 390 395 400

Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
405 410 415

Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
420 425 430

Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
435 440 445

Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
450 455 460

Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
465 470 475 480

His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
485 490 495

Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Lys Val
500 505 510

Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe
515 520 525

Asn Asn Lys Thr Ala His Ile Thr Val Asp Pro Lys Thr Phe Glu Val
530 535 540

Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Ala Ser Glu Val Pro
545 550 555 560

Leu Ala Gln Arg Tyr Thr Phe Phe
565

<210> 7
<211> 2183
<212> DNA
<213> Helicobacter felis

<220>
<221> CDS
<222> (3)..(683)

<220>
<221> CDS
<222> (694)..(2181)

<400> 7
tc gtg aaa ctc aca ccc aaa gag caa gaa aag ttc ttg tta tat tat 47
Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr
1 5 10 15

gcg ggc gaa gtg gct aga aag cgc aaa gca gag ggc tta aag ctc aat 95
Ala Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn
20 25 30

caa ccc gaa gcc att gcc tac att agt gcc cat att atg gac gag gcg 143
Gln Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala
35 40 45

cgc cgt ggc aaa aaa acc gtt gct gaa ctt atg gaa gaa tgt atg cac 191
Arg Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His
50 55 60

ttt ttg aaa aaa gat gag gtg atg ccc ggt gtg ggg aat atg gtc cct 239
Phe Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro
65 70 75

```
gat ttg ggc gta gaa gcc act ttc ccc gat ggc acc aaa ctc gta acc   287
Asp Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr
 80                  85                  90                  95

gtg aat tgg ccc att gaa cct gat gaa cac ttt aaa gcc ggt gaa gtg   335
Val Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val
                100                 105                 110

aaa ttt ggc tgt gat aaa gac att gag ctc aac gtg ggt aag gaa gtt   383
Lys Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Val Gly Lys Glu Val
            115                 120                 125

acc gag ctt gaa gtt acc aac gaa gga cct aaa tcc ttg cat gtg ggt   431
Thr Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly
        130                 135                 140

agc cat ttc cac ttc ttt gaa acc aac aag gca ttg aaa ttc gat cgg   479
Ser His Phe His Phe Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg
    145                 150                 155

gaa aaa gcc tat ggc aaa cgc cta gat att ccc tct ggc aac acg cta   527
Glu Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu
160                 165                 170                 175

cgc att ggg gca gga caa acc cgt aaa gtg cag tta atc cct ctt ggc   575
Arg Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly
                180                 185                 190

ggt agt aaa aaa gtg att ggc atg aac ggg ctt gtg aat aat att gcg   623
Gly Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala
            195                 200                 205

gac gaa cgc cat aaa cac aaa gca cta gac aag gca aaa tct cac gga   671
Asp Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly
        210                 215                 220

ttc atc aag taa ggagactccc atg aaa atg aaa aaa caa gag tat gta    720
```

```
Phe Ile Lys                 Met Lys Met Lys Lys Gln Glu Tyr Val
    225                             230                 235

aac acc tac gga ccc acc aca ggc gat aaa gtg cgc tta gga gat acc   768
Asn Thr Tyr Gly Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr
            240                 245                 250

gat ctt tgg gca gaa gta gaa cat gac tat acc act tat ggc gaa gag   816
Asp Leu Trp Ala Glu Val Glu His Asp Tyr Thr Thr Tyr Gly Glu Glu
        255                 260                 265

ctc aaa ttt ggc gcg ggt aaa act atc cgt gag ggt atg ggt cag agc   864
Leu Lys Phe Gly Ala Gly Lys Thr Ile Arg Glu Gly Met Gly Gln Ser
    270                 275                 280

aat agc cca gat gaa aac acc tta gat tta gtg atc acc aac gcg atg   912
Asn Ser Pro Asp Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met
285                 290                 295                 300

att atc gac tac acc ggg att tat aaa gcc gac att ggt att aaa aat   960
Ile Ile Asp Tyr Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn
                305                 310                 315

ggc aaa atc cat ggt att ggc aag gcg ggg aac aaa gac atg caa gat   1008
Gly Lys Ile His Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp
            320                 325                 330

ggc gta agc cct cat atg gtc gtg ggt gtg ggc aca gaa gca cta gca   1056
Gly Val Ser Pro His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala
        335                 340                 345

ggg gaa ggt atg att att acc gct ggg ggg atc gat tcg cac acc cac   1104
Gly Glu Gly Met Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His
    350                 355                 360

ttc ctc tct ccc caa caa ttc cct acc gct cta gcc aat ggt gtt aca   1152
Phe Leu Ser Pro Gln Gln Phe Pro Thr Ala Leu Ala Asn Gly Val Thr
365                 370                 375                 380
```

```
acc atg ttt gga ggt ggc aca ggt ccg gta gat ggc acg aat gcg acc   1200
Thr Met Phe Gly Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr
                385                 390                 395

acc atc act ccg ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gct   1248
Thr Ile Thr Pro Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala
            400                 405                 410

gaa gag tat tct atg aat gta ggc ttt ttg ggc aaa ggc aat agt tct   1296
Glu Glu Tyr Ser Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser
        415                 420                 425

agc aaa aaa caa ctt gta gaa caa gta gaa gcg ggc gcg att ggc ttt   1344
Ser Lys Lys Gln Leu Val Glu Gln Val Glu Ala Gly Ala Ile Gly Phe
    430                 435                 440

aaa ttg cat gaa gac tgg ggc aca aca cca agt gcg atc gat cac tgc   1392
Lys Leu His Glu Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys
445                 450                 455                 460

ttg agc gtg gca gat gaa tac gat gtg caa gtt tgt atc cac acc gat   1440
Leu Ser Val Ala Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp
                465                 470                 475

acg gtc aat gag gca ggt tat gtg gat gac acc cta aat gca atg aac   1488
Thr Val Asn Glu Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn
            480                 485                 490

ggg cgc gcc atc cat gcc tac cac att gag gga gcg ggc gga gga cac   1536
Gly Arg Ala Ile His Ala Tyr His Ile Glu Gly Ala Gly Gly Gly His
        495                 500                 505

tca cct gat gtt atc acc atg gca ggc gag ctc aat att cta ccc tcc   1584
Ser Pro Asp Val Ile Thr Met Ala Gly Glu Leu Asn Ile Leu Pro Ser
    510                 515                 520

tcc acc acc ccc act att ccc tat acc att aat acg gtt gca gaa cac   1632
```

```
Ser Thr Thr Pro Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His
525                 530                 535                 540

tta gac atg ctc atg acc tgc cac cac cta gat aag cgc atc cgc gag   1680
Leu Asp Met Leu Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu
                545                 550                 555

gat tta caa ttt tct caa agc cgt atc cgc ccc gga tct att gcc gct   1728
Asp Leu Gln Phe Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala
            560                 565                 570

gag gat gtg ctc cat gat att ggc gtg atc gcg atg act agc tcc gat   1776
Glu Asp Val Leu His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp
        575                 580                 585

tcg caa gca atg ggg cgc gct ggg gaa gtg att cct aga act tgg caa   1824
Ser Gln Ala Met Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln
    590                 595                 600

act gca gat aag aat aaa aaa gaa ttt ggt aag ctt cct gaa gat ggt   1872
Thr Ala Asp Lys Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Gly
605                 610                 615                 620

gca gat aac gac aac ttc cgc atc aaa cgc tat atc tcc aaa tac acc   1920
Ala Asp Asn Asp Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr
                625                 630                 635

att aat ccc gct ttg acc cat ggc gtg agc gag tat atc ggc tct gtg   1968
Ile Asn Pro Ala Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val
            640                 645                 650

gaa gag ggc aag atc gcc gac ttg gtg gtg tgg aat cct gcc ttt ttt   2016
Glu Glu Gly Lys Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe
        655                 660                 665

ggc gtg aaa cct aag att gtg att aaa ggt ggc atg gtg gtc ttc tct   2064
Gly Val Lys Pro Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser
    670                 675                 680
```

```
gaa atg ggc gat tct aac gcg tcc gtg ccc acg cct cag ccg gtt tat   2112
Glu Met Gly Asp Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr
685                 690                 695                 700

tac cgc gaa atg ttt ggg cac cac ggc aag gcg aaa ttt gac acc agc   2160
Tyr Arg Glu Met Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser
                705                 710                 715

atc act ttt cgt gtc tca agc gg                                    2183
Ile Thr Phe Arg Val Ser Ser
            720
```

<210> 8
<211> 226
<212> PRT
<213> Helicobacter felis

<400> 8

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Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
  1               5                  10                  15

Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
             20                  25                  30

Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
         35                  40                  45

Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
     50                  55                  60

Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
 65                  70                  75                  80

Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                 85                  90                  95
```

Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
100 105 110

Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Val Gly Lys Glu Val Thr
115 120 125

Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
130 135 140

His Phe His Phe Phe Glu Thr Asn Lys Ala Leu Lys Phe Asp Arg Glu
145 150 155 160

Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
165 170 175

Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
180 185 190

Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
195 200 205

Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
210 215 220

Ile Lys
225

<210> 9
<211> 496
<212> PRT
<213> Helicobacter felis

<400> 9
Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Thr
1 5 10 15

Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu

20 25 30

His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
35 40 45

Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
50 55 60

Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
65 70 75 80

Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
85 90 95

Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
100 105 110

Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
115 120 125

Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
130 135 140

Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
145 150 155 160

Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
165 170 175

Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
180 185 190

Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
195 200 205

Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
210 215 220

Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225 230 235 240

Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
245 250 255

Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
260 265 270

His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met
275 280 285

Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
290 295 300

Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
305 310 315 320

His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
325 330 335

Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
340 345 350

Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
355 360 365

Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
370 375 380

Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp Asn Phe Arg
385 390 395 400

Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
405 410 415

Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
420 425 430

```
Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
        435                 440                 445

Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
    450                 455                 460

Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
465                 470                 475                 480

His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Arg Val Ser Ser
                485                 490                 495
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<210> 10
<211> 2407
<212> DNA
<213> Helicobacter felis

<220>
<221> CDS
<222> (2)..(682)

<220>
<221> CDS
<222> (693)..(2399)

<400> 10

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c gtg aaa ctc aca ccc aaa gag caa gaa aag ttc ttg tta tat tat gcg 49
  Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
    1               5                  10                  15

ggc gaa gtg gct aga aag cgc aaa gcg gag ggc tta aag ctc aac caa   97
Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
            20                  25                  30

ccc gaa gcc att gcc tac att agt gcc cat att atg gac gag gcg cgc   145
```

```
Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
         35                  40                  45

cgt ggc aaa aag acc gtt gcg gaa ctt atg gaa gag tgt atg cac ttt   193
Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
     50                  55                  60

ttg aaa aaa gac gag gtg atg ccc ggt gtg ggg aat atg gtc cct gat   241
Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
 65                  70                  75                  80

tta ggc gtg gaa gct act ttt ccc gat ggc acc aaa ctc gta acc gtg   289
Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                 85                  90                  95

aat tgg ccc atc gaa ccc gat gaa cac ttc aaa gcg ggc gaa gtc aaa   337
Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
            100                 105                 110

ttt ggc tgt gat aaa gac att gaa ctc aac gca ggt aag gaa gtt acc   385
Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
        115                 120                 125

gaa cta gaa gtt acc aac gaa gga cct aaa tcc ttg cat gtg ggt agc   433
Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
    130                 135                 140

cat ttc cac ttc ttt gaa gcc aac aag gca ttg aaa ttc gat cgg gaa   481
His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
145                 150                 155                 160

aaa gcc tat ggc aaa cgc cta gat att ccc tct ggc aac acg cta cgc   529
Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
                165                 170                 175

att ggg gca gga caa acc cgt aaa gtg cag tta atc cct ctt ggc ggc   577
Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
            180                 185                 190
```

```
agt aaa aaa gtg att ggc atg aac ggg ctt gtg aat aat att gca gat   625
Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
        195                 200                 205

gaa cgc cat aaa cac aaa gcg tta gaa aaa gca aaa tct cac gga ttt   673
Glu Arg His Lys His Lys Ala Leu Glu Lys Ala Lys Ser His Gly Phe
    210                 215                 220

atc aaa taa ggagactccc atg aaa atg aaa aaa caa gag tat gta aat   722
Ile Lys                 Met Lys Met Lys Lys Gln Glu Tyr Val Asn
225                             230                 235

acc tac gga cct acc aca ggc gac aaa gtg cgc tta gga gat acc gat   770
Thr Tyr Gly Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr Asp
        240                 245                 250

ctt tgg gca gaa gta gaa cat gac tat acc act tat ggc gaa gag ctc   818
Leu Trp Ala Glu Val Glu His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu
    255                 260                 265

aaa ttt ggc gcg ggt aaa act atc cgt gag ggc atg ggt cag agc aat   866
Lys Phe Gly Ala Gly Lys Thr Ile Arg Glu Gly Met Gly Gln Ser Asn
270                 275                 280                 285

agt cca gat gaa aac acc cta gat tta gtc atc acc aac gcg atg att   914
Ser Pro Asp Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met Ile
                290                 295                 300

att gac tac acc ggg att tac aaa gcc gac att ggc att aaa aat ggc   962
Ile Asp Tyr Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly
            305                 310                 315

aaa atc cat ggc att ggc aag gca gga aac aag gac atg caa gat ggc  1010
Lys Ile His Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp Gly
        320                 325                 330

gta agc cct cat atg gtc gtg ggt gtg ggc aca gaa gca tta gca ggg  1058
```

```
Val Ser Pro His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala Gly
    335                 340                 345

gaa ggt atg att att acc gct ggg ggg atc gat tca cac acc cac ttc   1106
Glu Gly Met Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His Phe
350                 355                 360                 365

ctc tct cca caa caa ttc cct acc gct cta gcc aat ggc gtt aca acc   1154
Leu Ser Pro Gln Gln Phe Pro Thr Ala Leu Ala Asn Gly Val Thr Thr
                370                 375                 380

atg ttt ggc ggt ggc aca ggt ccg gta gat ggc acg aat gcg act acc   1202
Met Phe Gly Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr Thr
            385                 390                 395

atc act ccg ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gct gaa   1250
Ile Thr Pro Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala Glu
        400                 405                 410

gag tat tct atg aat gtg ggc ttt ttg ggc aaa ggc aat agc tcc agt   1298
Glu Tyr Ser Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser
    415                 420                 425

aaa aaa caa ctt gta gaa caa ata gaa gcg ggc gcg atc ggc ttt aaa   1346
Lys Lys Gln Leu Val Glu Gln Ile Glu Ala Gly Ala Ile Gly Phe Lys
430                 435                 440                 445

ttg cat gaa gac tgg ggc aca act cca agt gca atc gat cac tgc ttg   1394
Leu His Glu Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys Leu
                450                 455                 460

agc gta gca gat gaa tac gat gtg caa gtt tgt atc cac acc gat acg   1442
Ser Val Ala Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp Thr
            465                 470                 475

gtc aat gag gca ggt tat gta gat gac acc ctg aat gcg atg aac ggg   1490
Val Asn Glu Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn Gly
        480                 485                 490
```

```
cgc gcc atc cat gcc tac cac att gag gga gcg ggc gga gga cac tca   1538
Arg Ala Ile His Ala Tyr His Ile Glu Gly Ala Gly Gly Gly His Ser
    495                 500                 505

cct gat gtt atc acc atg gca ggc gag ctc aat att cta ccc tcc tcc   1586
Pro Asp Val Ile Thr Met Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser
510                 515                 520                 525

aca acc ccc act atc ccc tat acc att aat acg gtt gca gaa cac tta   1634
Thr Thr Pro Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His Leu
                530                 535                 540

gac atg ctc atg acc tgc cac cac cta gat aaa cgc atc cgc gag gat   1682
Asp Met Leu Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu Asp
            545                 550                 555

tta caa ttt tcc caa agc cgt atc cgc ccc ggc tct atc gcc gct gaa   1730
Leu Gln Phe Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu
        560                 565                 570

gat gtg ctc cat gat att ggc gtg atc gcg atg aca agc tcg gat tcg   1778
Asp Val Leu His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp Ser
    575                 580                 585

caa gca atg ggg cgc gct ggc gaa gtg att cct cga act tgg cag act   1826
Gln Ala Met Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln Thr
590                 595                 600                 605

gcg gat aag aat aaa aaa gaa ttt ggt aag ctt cct gaa gat agt gca   1874
Ala Asp Lys Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Ser Ala
                610                 615                 620

gat aac gac aac ttc cgt atc aaa cgc tac atc tcc aaa tac act att   1922
Asp Asn Asp Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile
            625                 630                 635

aac ccc gct cta acc cat ggg gta agc gag tat atc ggc tct gtg gaa   1970
```

```
Asn Pro Ala Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val Glu
        640                 645                 650

gag ggc aaa atc gct gat ttg gtg gtg tgg aat cct gcc ttt ttt ggt   2018
Glu Gly Lys Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe Gly
    655                 660                 665

gtg aaa cct aag att gtg atc aaa ggc ggt atg gtg gtc ttc tct gaa   2066
Val Lys Pro Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser Glu
670                 675                 680                 685

atg ggc gac tcc aac gcg tcc gtg cct aca cct cag ccg gtt tat tac   2114
Met Gly Asp Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr
                690                 695                 700

cgc gaa atg ttt ggg cat cac ggc aag gcg aaa ttt gac acc agc atc   2162
Arg Glu Met Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser Ile
            705                 710                 715

act ttt gtt tcc aaa gtc gcc tat gaa aat ggc gtg aaa gaa aaa cta   2210
Thr Phe Val Ser Lys Val Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu
        720                 725                 730

ggc tta gag cgc aag gtg cta ccc gtg aaa aac tgc cgc aac atc act   2258
Gly Leu Glu Arg Lys Val Leu Pro Val Lys Asn Cys Arg Asn Ile Thr
    735                 740                 745

aag aaa gac ttc aaa ttc aac aac aag acg gcg cat atc act gtc gat   2306
Lys Lys Asp Phe Lys Phe Asn Asn Lys Thr Ala His Ile Thr Val Asp
750                 755                 760                 765

cct aaa acc ttc gag gtc ttt gta gat ggc aaa ctc tgc acc tct aaa   2354
Pro Lys Thr Phe Glu Val Phe Val Asp Gly Lys Leu Cys Thr Ser Lys
                770                 775                 780

ccc gcc tct gaa gtg cct cta gcc cag cgc tac act ttc ttc tag       2399
Pro Ala Ser Glu Val Pro Leu Ala Gln Arg Tyr Thr Phe Phe
            785                 790                 795
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gcncaatg 2407

<210> 11
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<212> PRT
<213> Helicobacter felis

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Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
  1               5                  10                  15

Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
             20                  25                  30

Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
         35                  40                  45

Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
     50                  55                  60

Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
 65                  70                  75                  80

Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                 85                  90                  95

Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
            100                 105                 110

Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
        115                 120                 125

Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
    130                 135                 140

His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
```

145 150 155 160

Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
165 170 175

Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
180 185 190

Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
195 200 205

Glu Arg His Lys His Lys Ala Leu Glu Lys Ala Lys Ser His Gly Phe
210 215 220

Ile Lys
225

<210> 12
<211> 568
<212> PRT
<213> Helicobacter felis

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Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu
20 25 30

His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys
35 40 45

Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
50 55 60

Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
65 70 75 80

Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
85 90 95

Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
100 105 110

Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
115 120 125

Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
130 135 140

Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
145 150 155 160

Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
165 170 175

Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
180 185 190

Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
195 200 205

Gln Ile Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
210 215 220

Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225 230 235 240

Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
245 250 255

Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
260 265 270

His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met

275 280 285

Ala Gly Glu Leu Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
290 295 300

Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
305 310 315 320

His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
325 330 335

Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
340 345 350

Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
355 360 365

Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
370 375 380

Glu Phe Gly Lys Leu Pro Glu Asp Ser Ala Asp Asn Asp Asn Phe Arg
385 390 395 400

Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
405 410 415

Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
420 425 430

Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
435 440 445

Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
450 455 460

Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
465 470 475 480

```
His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
                485                 490                 495

Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Lys Val
            500                 505                 510

Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe
        515                 520                 525

Asn Asn Lys Thr Ala His Ile Thr Val Asp Pro Lys Thr Phe Glu Val
    530                 535                 540

Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Ala Ser Glu Val Pro
545                 550                 555                 560

Leu Ala Gln Arg Tyr Thr Phe Phe
                565
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<210> 13
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<213> Helicobacter felis

<220>
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<222> (739)..(2445)

<400> 13

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                                                    Val Lys Leu
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aca ccc aaa gag caa gaa aag ttc ttg tta tat tat gcg ggc gaa gtg   104
Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala Gly Glu Val
      5                  10                  15

gct aga aag cgc aaa gca gag ggc tta aag ctc aac caa ccc gaa gcc   152
Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln Pro Glu Ala
 20                  25                  30                  35

att gcc tac att agt gcc cat att atg gac gag gcg cgt cgt ggc aaa   200
Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg Arg Gly Lys
                 40                  45                  50

aaa acc gtt gcg gaa ctt atg gaa gag tgt atg cac ttt ttg aaa aaa   248
Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe Leu Lys Lys
             55                  60                  65

gac gag gtg atg ccc ggg gtg ggg aat atg gtc cct gat ttg ggc gtg   296
Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp Leu Gly Val
         70                  75                  80

gaa gcc act ttc ccc gat ggc acc aaa ctc gta act gtg aat tgg ccc   344
Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val Asn Trp Pro
     85                  90                  95

atc gaa cct gat gaa cac ttt aag gcg ggt gaa gtg aaa ttt ggc tgt   392
Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys Phe Gly Cys
100                 105                 110                 115

gat aaa gac att gaa ctc aac gca ggt aag gaa gtt acc gaa cta gaa   440
Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr Glu Leu Glu
                120                 125                 130

gtt act aac gaa gga cct aaa tcc ttg cat gtg ggt agc cat ttc cac   488
Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser His Phe His
            135                 140                 145

ttc ttt gaa gcc aac aaa gca ttg aaa ttc gat cgg gaa aaa gcc tat   536
Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu Lys Ala Tyr
```

```
        150                 155                 160

ggc aaa cgc cta gat att ccc tct ggc aac aca cta cgc att ggg gca   584
Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg Ile Gly Ala
    165                 170                 175

gga caa acc cgt aaa gtg cag tta atc cct ctt ggc ggt agt aaa aaa   632
Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly Ser Lys Lys
180                 185                 190                 195

gtg att ggc atg aac ggg ctt gtg aat aat att gcg gac gaa cgc cat   680
Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp Glu Arg His
                200                 205                 210

aaa cac aaa gcg cta gac aaa gca aaa tct cac gga ttt atc aag taa   728
Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe Ile Lys
            215                 220                 225

ggagactccc atg aaa atg aaa aaa caa gag tat gta aat acc tac gga   777
           Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly
                   230                 235                 240

ccc acc aca ggc gat aaa gtg cgc tta gga gat acc gat ctt tgg gca   825
Pro Thr Thr Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala
                245                 250                 255

gaa gta gaa cat gac tat acc acc tat ggc gaa gaa ctc aaa ttc ggt   873
Glu Val Glu His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly
            260                 265                 270

gca ggt aaa act atc cgt gag ggt atg ggt cag agc aat agc cca gat   921
Ala Gly Lys Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp
        275                 280                 285

gaa aac acc tta gat tta gtg atc acc aac gcg atg att att gac tac   969
Glu Asn Thr Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr
    290                 295                 300
```

```
acc ggg att tac aaa gcc gac att ggc att aaa aat ggc aaa atc cat   1017
Thr Gly Ile Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His
305                 310                 315                 320

ggc att ggc aag gca gga aac aag gac atg caa gat ggc gta agc cct   1065
Gly Ile Gly Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro
                325                 330                 335

cat atg gtc gtg ggt gtg ggc aca gaa gca cta gca ggg gaa ggt atg   1113
His Met Val Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met
            340                 345                 350

att att acc gct ggg ggg atc gat tca cac acc cac ttc ctc tct cca   1161
Ile Ile Thr Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro
        355                 360                 365

caa caa ttc cct acc gct cta gcc aat ggc gtt aca aca atg ttt ggc   1209
Gln Gln Phe Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly
    370                 375                 380

ggt ggc aca ggc ccc gta gat ggc acg aat gcg act acc atc act ccg   1257
Gly Gly Thr Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro
385                 390                 395                 400

ggc aaa tgg aac ttg cac cgc atg ttg cgc gca gca gaa gag tat tct   1305
Gly Lys Trp Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser
                405                 410                 415

atg aat gtg ggc ttt ttg ggc aaa ggc aat agc tct agt aaa aaa caa   1353
Met Asn Val Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln
            420                 425                 430

ctt gta gaa caa gta gaa gcg ggc gcg att ggt ttt aaa ttg cat gaa   1401
Leu Val Glu Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu
        435                 440                 445

gac tgg ggc aca act cca agt gcg atc gat cac tgc ttg agc gta gca   1449
Asp Trp Gly Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala
```

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    450                 455                 460

gat gaa tac gat gtg caa gtt tgt ata cac acc gat acg gtc aat gag   1497
Asp Glu Tyr Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu
465                 470                 475                 480

gca ggt tat gta gat gac acc cta aat gca atg aac ggg cgc gcc atc   1545
Ala Gly Tyr Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile
                485                 490                 495

cat gcc tac cac att gag gga gcg ggt gga gga cac tca cct gat gtt   1593
His Ala Tyr His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val
            500                 505                 510

atc acc atg gca ggc gaa gtg aat att cta ccc tcc tcc aca acc cct   1641
Ile Thr Met Ala Gly Glu Val Asn Ile Leu Pro Ser Ser Thr Thr Pro
        515                 520                 525

act atc ccc tat acc att aat acg gtt gca gaa cac tta gac atg ctt   1689
Thr Ile Pro Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu
    530                 535                 540

atg acc tgc cac cac cta gat aaa cgc atc cgc gag gat ctc caa ttt   1737
Met Thr Cys His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe
545                 550                 555                 560

tct caa agc cgt atc cgc ccc ggc tct atc gcc gct gaa gat gtg ctc   1785
Ser Gln Ser Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu
                565                 570                 575

cat gat atc ggt gtg atc gcg atg aca agt tcc gat tcg caa gca atg   1833
His Asp Ile Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met
            580                 585                 590

ggg cgc gct ggg gaa gtg att cct aga act tgg caa act gca gac aag   1881
Gly Arg Ala Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys
        595                 600                 605
```

```
aat aaa aaa gaa ttt ggt aag ctt cct gaa gat ggt gca gat aat gac   1929
Asn Lys Lys Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp
    610                 615                 620

aac ttc cgc atc aaa cgc tat atc tcc aaa tac acc att aat ccc gct   1977
Asn Phe Arg Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala
625                 630                 635                 640

ttg acc cat ggc gtg agc gag tat atc ggc tct gtg gaa gag ggc aag   2025
Leu Thr His Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys
                645                 650                 655

atc gcc gac ttg gtg gtg tgg aat cct gcc ttt ttt ggc gta aaa ccc   2073
Ile Ala Asp Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro
            660                 665                 670

aaa atc gtg atc aaa ggc ggt atg gtg gtg ttc tct gaa atg ggc gat   2121
Lys Ile Val Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp
        675                 680                 685

tct aat gcg tct gtg ccc act cct cag ccg gtt tat tac cgc gaa atg   2169
Ser Asn Ala Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met
    690                 695                 700

ttt ggg cat cac ggc aag gcg aaa ttt gac acc agc atc act ttt gtt   2217
Phe Gly His His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val
705                 710                 715                 720

tcc aaa gtc gcc tat gaa aat ggt gtg aaa gaa aaa cta ggt tta gag   2265
Ser Lys Val Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu
                725                 730                 735

cgc aag gtg ctc ccc gtg aaa aac tgc cgt aac atc acc aag aag gac   2313
Arg Lys Val Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp
            740                 745                 750

ttc aag ttc aac gac aaa act gca aaa atc acc gtc gat ccg aaa acc   2361
Phe Lys Phe Asn Asp Lys Thr Ala Lys Ile Thr Val Asp Pro Lys Thr
```

```
        755                 760                 765

ttc gag gtc ttt gta gat ggc aaa ctc tgc acc tct aaa ccc acc tct   2409
Phe Glu Val Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Thr Ser
    770                 775                 780

gaa gtg cct cta gcc caa cgc tac act ttc ttc tag gcataat           2452
Glu Val Pro Leu Ala Gln Arg Tyr Thr Phe Phe
785                 790                 795
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<210> 14
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<212> PRT
<213> Helicobacter felis

<400> 14

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Val Lys Leu Thr Pro Lys Glu Gln Glu Lys Phe Leu Leu Tyr Tyr Ala
  1               5                  10                  15

Gly Glu Val Ala Arg Lys Arg Lys Ala Glu Gly Leu Lys Leu Asn Gln
             20                  25                  30

Pro Glu Ala Ile Ala Tyr Ile Ser Ala His Ile Met Asp Glu Ala Arg
         35                  40                  45

Arg Gly Lys Lys Thr Val Ala Glu Leu Met Glu Glu Cys Met His Phe
     50                  55                  60

Leu Lys Lys Asp Glu Val Met Pro Gly Val Gly Asn Met Val Pro Asp
 65                  70                  75                  80

Leu Gly Val Glu Ala Thr Phe Pro Asp Gly Thr Lys Leu Val Thr Val
                 85                  90                  95

Asn Trp Pro Ile Glu Pro Asp Glu His Phe Lys Ala Gly Glu Val Lys
            100                 105                 110
```

Phe Gly Cys Asp Lys Asp Ile Glu Leu Asn Ala Gly Lys Glu Val Thr
115 120 125

Glu Leu Glu Val Thr Asn Glu Gly Pro Lys Ser Leu His Val Gly Ser
130 135 140

His Phe His Phe Phe Glu Ala Asn Lys Ala Leu Lys Phe Asp Arg Glu
145 150 155 160

Lys Ala Tyr Gly Lys Arg Leu Asp Ile Pro Ser Gly Asn Thr Leu Arg
165 170 175

Ile Gly Ala Gly Gln Thr Arg Lys Val Gln Leu Ile Pro Leu Gly Gly
180 185 190

Ser Lys Lys Val Ile Gly Met Asn Gly Leu Val Asn Asn Ile Ala Asp
195 200 205

Glu Arg His Lys His Lys Ala Leu Asp Lys Ala Lys Ser His Gly Phe
210 215 220

Ile Lys
225

<210> 15
<211> 568
<212> PRT
<213> Helicobacter felis

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Met Lys Met Lys Lys Gln Glu Tyr Val Asn Thr Tyr Gly Pro Thr Thr
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Gly Asp Lys Val Arg Leu Gly Asp Thr Asp Leu Trp Ala Glu Val Glu
20 25 30

His Asp Tyr Thr Thr Tyr Gly Glu Glu Leu Lys Phe Gly Ala Gly Lys

```
          35                  40                  45

Thr Ile Arg Glu Gly Met Gly Gln Ser Asn Ser Pro Asp Glu Asn Thr
     50                  55                  60

Leu Asp Leu Val Ile Thr Asn Ala Met Ile Ile Asp Tyr Thr Gly Ile
 65                  70                  75                  80

Tyr Lys Ala Asp Ile Gly Ile Lys Asn Gly Lys Ile His Gly Ile Gly
                 85                  90                  95

Lys Ala Gly Asn Lys Asp Met Gln Asp Gly Val Ser Pro His Met Val
            100                 105                 110

Val Gly Val Gly Thr Glu Ala Leu Ala Gly Glu Gly Met Ile Ile Thr
        115                 120                 125

Ala Gly Gly Ile Asp Ser His Thr His Phe Leu Ser Pro Gln Gln Phe
    130                 135                 140

Pro Thr Ala Leu Ala Asn Gly Val Thr Thr Met Phe Gly Gly Gly Thr
145                 150                 155                 160

Gly Pro Val Asp Gly Thr Asn Ala Thr Thr Ile Thr Pro Gly Lys Trp
                165                 170                 175

Asn Leu His Arg Met Leu Arg Ala Ala Glu Glu Tyr Ser Met Asn Val
            180                 185                 190

Gly Phe Leu Gly Lys Gly Asn Ser Ser Ser Lys Lys Gln Leu Val Glu
        195                 200                 205

Gln Val Glu Ala Gly Ala Ile Gly Phe Lys Leu His Glu Asp Trp Gly
    210                 215                 220

Thr Thr Pro Ser Ala Ile Asp His Cys Leu Ser Val Ala Asp Glu Tyr
225                 230                 235                 240
```

```
Asp Val Gln Val Cys Ile His Thr Asp Thr Val Asn Glu Ala Gly Tyr
                245                 250                 255

Val Asp Asp Thr Leu Asn Ala Met Asn Gly Arg Ala Ile His Ala Tyr
            260                 265                 270

His Ile Glu Gly Ala Gly Gly Gly His Ser Pro Asp Val Ile Thr Met
        275                 280                 285

Ala Gly Glu Val Asn Ile Leu Pro Ser Ser Thr Thr Pro Thr Ile Pro
    290                 295                 300

Tyr Thr Ile Asn Thr Val Ala Glu His Leu Asp Met Leu Met Thr Cys
305                 310                 315                 320

His His Leu Asp Lys Arg Ile Arg Glu Asp Leu Gln Phe Ser Gln Ser
                325                 330                 335

Arg Ile Arg Pro Gly Ser Ile Ala Ala Glu Asp Val Leu His Asp Ile
            340                 345                 350

Gly Val Ile Ala Met Thr Ser Ser Asp Ser Gln Ala Met Gly Arg Ala
        355                 360                 365

Gly Glu Val Ile Pro Arg Thr Trp Gln Thr Ala Asp Lys Asn Lys Lys
    370                 375                 380

Glu Phe Gly Lys Leu Pro Glu Asp Gly Ala Asp Asn Asp Asn Phe Arg
385                 390                 395                 400

Ile Lys Arg Tyr Ile Ser Lys Tyr Thr Ile Asn Pro Ala Leu Thr His
                405                 410                 415

Gly Val Ser Glu Tyr Ile Gly Ser Val Glu Glu Gly Lys Ile Ala Asp
            420                 425                 430

Leu Val Val Trp Asn Pro Ala Phe Phe Gly Val Lys Pro Lys Ile Val
        435                 440                 445
```

Ile Lys Gly Gly Met Val Val Phe Ser Glu Met Gly Asp Ser Asn Ala
450 455 460

Ser Val Pro Thr Pro Gln Pro Val Tyr Tyr Arg Glu Met Phe Gly His
465 470 475 480

His Gly Lys Ala Lys Phe Asp Thr Ser Ile Thr Phe Val Ser Lys Val
485 490 495

Ala Tyr Glu Asn Gly Val Lys Glu Lys Leu Gly Leu Glu Arg Lys Val
500 505 510

Leu Pro Val Lys Asn Cys Arg Asn Ile Thr Lys Lys Asp Phe Lys Phe
515 520 525

Asn Asp Lys Thr Ala Lys Ile Thr Val Asp Pro Lys Thr Phe Glu Val
530 535 540

Phe Val Asp Gly Lys Leu Cys Thr Ser Lys Pro Thr Ser Glu Val Pro
545 550 555 560

Leu Ala Gln Arg Tyr Thr Phe Phe
565

<210> 16
<211> 21
<212> DNA
<213> Helicobacter felis

<400> 16
catgcacttt ttgaaaaaag a 21

<210> 17
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<212> DNA
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<400> 17
tatggtggtc ttctct 16

<210> 18
<211> 32
<212> DNA
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<400> 18
ggagtaacat atgaaactca cacccaaaga gc 32

<210> 19
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<400> 19
cacacccacg accatgtgag ggcttac 27

<210> 20
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<400> 20
gtaagccctc acatggtcgt gggtgtg 27

<210> 21
<211> 34
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<213> Helicobacter felis

<400> 21

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